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ASSESSMENT OF HARD-TO-RECOVER OIL RESERVES PRODUCTION POTENTIAL IN TOMSK REGION[1]

The development of the licensed areas, profound geological exploration, enhanced oil recovery due to innovative technologies introduction and revitalization of oil production from unconventional horizons could significantly increase the oil production in the Tomsk region. This article deals with the issue of oil producing companies' affairs of the Tomsk region for the past 10 years and proves the oil production potential growth through the development of both conventional and hard-to-recover unconventional oil reserves, concentrated in the Bazhenov and Tyumen Formations, as well as in the Lower Jurassic sediments. The Russian Federation is far behind from the economically developed countries, especially from the United States, in the exploitation of hard-to-recover unconventional hydrocarbon resources. The "shale revolution" was determined by a complex of financial and tax incentives introduced for oil and gas companies. However, this was mainly beneficial for medium and small sized companies. Therefore, both the business entities and regional authorities should increase the investments spending, as well as introduce the additional tax incentives considering the quality and type of potentially available raw hydrocarbons produced in the region, in contrast to the declared benefits in the territory of Eastern Siberia. The introduction of tax incentives justified by the authors, and the implementation of public-private partnership mechanism will ensure the profitability of marginal and hard-to-recover deposits development of the Tomsk region in the long run, which in its turn, should ensure the stability of the economic development of the reviewed subject of the Russian Federation.

Keywords: oil production, hard-to-recover reserves, tax incentive, Bazhenov Formation, Mineral Production Tax

Introduction. Tomsk regional oil companies' activities — a brief review

In accordance with the Strategy of Tomsk Region Development and Tomsk Region Energy Strategy for the period till the year 2020, the oil and gas sector will remain as the basic sector of the economy alongside with the other priorities such as information technology, academic complex, agriculture and timber industry[2].

Only 4 % of the total amount of companies are involved in the petroleum sector, the number of companies involved in the related industries is 20 %.

Every year about 21 % of tax revenues into Tomsk region budget system come from oil and gas companies, in addition, 19 % of budget revenues come from the enterprises accompanying the activities of the petroleum sector.

The total investment in the fixed assets (including the social infrastructure) for the year 2013 amounted 33bn RUB, at that, 162 mln RUB was spent by the production companies on social needs and charity.

The share of the petroleum sector in the industrial production volume of the region is about 50 %. There is a close correlation between the gross regional product and the dynamics of oil production in the Tomsk region. Thus, the economic prosperity of this area largely depends on the efficiency of the production companies having the license for the exploration and production of hydrocarbons in the region.

[1] Original Russian Text © I. V. Sharf, L. S. Grinkevich, 2016, published in Ekonomika regiona [Economy of Region]. — 2016. — Vol. 12, Issue 1. — 201–210.

[2] Main provisions of the Draft of Russian Energy Strategy for the period up to 2035 // The Russian Ministry of Energy. (In Russian). Retrieved from: http://minenergo.gov.ru/documents/razrabotka/17481.html?sphrase_id=805954 pdf (date of access: January 22, 2015); Strategy for Socio-Economic Development of the Tomsk region for the period up to 2020 (with the forecast up to 2025) // Tomsk Region Administration. (In Russian). Retrieved from: http://storage.esp.tomsk.gov.ru/files/15413/643.pdf (date of access: January 22, 2015); Energy strategy of Tomsk region for the period till 2020 // Tomsk Region Administration. (In Russian). Retrieved from: http://tomsk.gov.ru/ru/regionalnoe-razvitie/regionalnoe-strategicheskoe-planirovanie/reestr-dokumentov-strategicheskogo-planirovaniya-tomskoy-oblasti#otr_str (date of access: January 22, 2015).

It should be noted that according to the Draft of Russian Energy Strategy for the period up to 2035, the increase in oil production in the Russian Federation should be ensured by the active development of Eastern Siberia and the Arctic continental shelf. However, at present, the West Siberian deposits, including the Tomsk region, provide a significant share in the total volume of oil production in the country — 6.4 million barrels per day[3]. The Tomsk region ranks third in Western Siberia for the extraction of raw hydrocarbons after the Khanty-Mansiysk Autonomous Region and the Tyumen region. In future, the West Siberian region will continue to play a significant role.

In order to assess the prospects of the Tomsk region oil companies functioning under the conditions of current economic and regulatory environment, the analysis of financial and production indexes of oil-producing companies in the region was done; the factors influencing the efficiency and effectiveness of companies' activities were identified. At that, particular attention was paid to the assessment of tax mechanism influence as an effective tool to stimulate innovation and investment activity of oil producing companies.

The distributed subsoil fund, available for the production companies of the Tomsk region is located on the territory of 72.8 thousand km^2 and covers 131 hydrocarbon deposits, including: 102 — oil deposits, 21 — oil and gas condensate fields, 8 — gas condensate fields. Among them, 112 deposits are classified as small. Unallocated subsoil fund is 151.4 km^2.

The number of oil production companies was gradually decreasing from 2007 till 2013. In 2007, 44 oil production companies (excluding drilling service companies) were operating under the license agreement, in 2008 — the number of companies was 46, in 2009 — 42, in 2011 — 42 and in 2013 — only 34. Such dynamics is explained by the cancelation of licenses for a number of production companies, as well as by the processes of merger and acquisition. As of January 1, 2014, the geological exploration for oil and gas production in the region is carried out by 33 companies, 22 of them have the production license. Currently, 15 enterprises realize hydrocarbon production in the Tomsk region.

The leading oil production company is OAO "Tomskneft" VNK (Table 1), which produces more than a half of total amount of oil produced in the Tomsk region. However, even this company has a decrease in hydrocarbon production for the last 10 years. If in 2004, the volume of produced oil was 13.6 million tons, in 2013, it was only 6.3 million tons. The second group is comprised by the companies producing less than 1.000 tons of oil, among them are: OOO "Matyushkinskaya vertikal", OOO "Imperial Energy", OOO "Stimul-T", OAO "VTK" etc. And to the third group refer the companies whose share in total production is insignificant (less than 100 thousand tons), for example, OOO "Zhiant", OOO "Tomskgeoneftegaz", OOO "Yuzhno-Okhteurskoe" and others.

The share of oil production by small Tomsk region oil companies in 2013 amounted 4.5 million tons; that is about 40 % from the total production of the region. At that, there is a relative decrease in the level of production by OAO "Tomskneft" due to the depletion of major oil deposits. At the same time, not all oil producing companies fulfill the plan in oil production, specified in the license agreement and project documents.

The majority of small Tomsk region oil companies is at an early stage of field development and have not reached the oil production peak yet. Significant growth in oil production could be expected in short and medium-term; this has been already confirmed by the increase in oil production by a number of oil producing companies.

Not all the fields have been put into exploration yet. OAO "Tomskneft" has 52 license areas (fields) from which only 29 are developed. The rest of the production companies have the number of license areas ranging from 1 to 9, but only a part of them is under exploration due to the lack of available investments. Therefore, these license areas are considered as a deferred asset.

The analysis of oil production companies CAPEX plan shows a significant differentiation both in the amount of investments into the fixed assets and the level of plan realization (Table 2).

As it is seen from the Table 2, a significant underperformance is typical for the third group companies producing less than 100 thousand tons.

The main areas of investments were:

— gas pipeline construction due to the requirement of 97 % associated gas utilization;

— equipment purchase;

— field facilities construction;

[3] Overview // U.S. Energy Information Administration (EIA). Retrieved from: http://www.eia.gov/countries/cab.cfm?fips=rs.

Table 1

Dynamics of oil production in Tomsk region

Company	Volume of oil produced, thousand tons			
	2010	2011	2012	2013
OAO "VTK"	340.6	387.5	424	443.2
OAO “Tomskgazprom”	590	797.4	1059.3	1084.9
OOO "Zhiant"	—	1.4	1.5	0.5
OOO "Matyushkinskaya vertikal"	149.6	163.1	206.2	191.3
OOO "Imperial Energy"	97.8	790.1	621.1	415.8
OOO “Stimul-T”	25.2	99.7	104.8	112.9
OOO “Tomskaya neft”	64	56.8	n/a	n/a
OOO “Tomskgeoneftegaz”	13	21.4	29.4	24.1
OOO "Yuzhno-Okhteurskoe"	—	78.2	74.8	66.0
OAO “Tomskneft” VNK	7208	7273.4	6969.8	6779.7

Table 2

Realization of CAPEX plan

Company	Actual 2011 RUB mln	Plan 2012 RUB mln	Actual 2012 RUB mln	% of fulfillment 2012	Plan 2013 RUB mln	Actual 2013
OAO “Tomskneft” VNK	8938	9925	9881	100	7155	10590.2
OOO “Sredne-Vasyuganskoe”	16	16	13	81	193	n/a
OOO “Yuzhno-Okhteurskoe”	478	500	439	88	509	406.5
OAO “Tomskgazprom”	5577	5489	5738	105	12499	9222.7
OAO "VTK"	402	2326	1309	56	511	537.5
OOO “Gazpromneft-Vostok”	5337	3697	3152	85	4434	5511.7
ZAO “Tomskaya neft”	3737	3490	4145	119	3789	3982.9
OAO “Tomskaya neftegazovaya kompaniya”	0	350	0	0	138	n/a
OOO "Matyushkinskaya vertikal"	2426	2167	1966	91	135	227.7
OOO "Imperial Energy"	1916	23	67.3	293	273	645.0
OOO “Tomskgeoneftegaz”	100	822	135	16	1372	850.5
OOO “Stimul-T”	1570	2065	178	9	128	65.0
OOO “Zhiant”	33	119	62	52	224	8.4
Total	30529	30989	27085	87	31358	

— projecting and surveying;
— drilling.

It is obvious that the introduction of new technologies to increase the production and exploitation by drilling intensification requires significant investment. At that, the volume of exploration work should be increased.

At present, in the Tomsk region, according to the experts, the exploration of recoverable reserves estimates 42 %, of crude oil — 39.6 %, of non-associated gas — 44.8 %. The depletion of oil reserves is 46 %, of non-associated gas — 21 %. Total initial recoverable resources amount 2.4 billion tons of conventional hydrocarbons, among them: oil — 1.6 billion tons; 671.6 billion m3 of associated gas, 54.8 million tons of gas condensate, and the rest — oil dissolved gas. Initial proven reserves of categories A + B + C1 in the Tomsk region up to January 1, 2014 are 698.5 million tons of crude oil, natural gas — 365.1 billion m^3, condensate — 34.6 million tons.

The situation with the existing reserves and resources in the Tomsk region is consistent with the nationwide trends. Changing of qualitative and quantitative characteristics of hydrocarbon reserves

Table 3

Correlation between oil production and oil reserves growth from 2004 till 2013

Criteria	Year									
	2004	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
Production, mln *t*	**15.46**	**11.16**	**9.85**	**9.99**	**10.09**	**10.16**	**10.53**	**11.5**	**11.7**	**11.3**
Reserves growth of C1 category	4.09	4.15	2.92	37.74	22.1	19.3	10.36	42.7	12.1	9.8

is expressed in the growth of hard-to-recover reserves share in geological and geographical aspects, with a parallel increase in the share of small and medium-sized deposits. If in 1990, 50–60 % of the oil was produced from new deposits, in 1960, the number was 20–25 %, currently only 12–15 %, and in the long run according to the geological forecast it will be about 7–10 %. Also, the Russian oil resource base is characterized by a high concentration. The state balance accounts 2885 deposits of oil reserves; more than a half of the proven oil reserves are deposited in 11 unique (with the reserves of more than 300 million tons) and 85 large (60–300 million tons) reservoirs; among them 9 unique and 56 large deposits are located in the West Siberian petroleum basin [1, p. 197].

In the period from 2010 to 2014, the volume of funds for oil and gas production in the Tomsk region amounted 5.9 billion RUB, the share of federal funds was about 0.4–0.7 bln. (in average up to 9 %). Thus, the ratio of the exploration work financing in the Tomsk region is — 14.4 RUB of production companies per 1 ruble of budget, while the average figure in Russia is approximately 11 [2]. A similar situation occurs in other regions [1, p. 199].

Considering the annual oil production in the Tomsk region at the level of about 11 million tons and the deteriorating geological conditions, the growth of reserves should be higher (Table 3).

Speaking about the reserves growth, due to the activity of the production companies on their license areas, it should be considered that the Tomsk region deposits are mainly small in the number of reserves and are characterized by hazard production conditions. Therefore, the profitability of production and the value of proved reserves, in accordance with the international classification of International Society of Petroleum Engineers, is put under the question.

Prospects of Tomsk region unconventional reserves exploration

Due to the sustained volatility in the dynamics of oil production in the Tomsk region and a slight growth of the reserves produced from conventional resources, a need for hydrocarbon production from hard-to-recover reserves, which is especially important in the conditions of the "shale revolution", is still remaining.

The observed "shale revolution" directly affects the interests of Russia and oil producing regions not only as one of the main suppliers of black and blue gold on the world market, but also as an oil and gas dependent country. According to the foreign analysts, the oil production structure will change significantly. The share of oil from low permeability rocks in the market will be about 7 % by 2035, while biofuel and oil sands — 3 % and 5 % respectively [3, p. 207]. At the same time, one-third of oil from low permeability rocks will be produced outside the USA [4, p. 3].

Therefore, it is interesting to analyze the effectiveness of measures to stimulate the development of unconventional hydrocarbon resources in the Russian Federation.

Unconventional gas resources include gas hydrates, gas from dense low permeability rock (reservoir permeability ≈ 1 mD), coalbed methane (reservoir permeability ≈ 0.1 mD), shale gas (reservoir permeability 0.001mD), water-dissolved gas, deep horizons gas.

To unconventional gas resources refer:

a) bituminous oil extracted from tar sands, which is a mixture of sand, clay, water and bitumen;

b) oil from low permeability rocks which are characterized by mixed lithology (reservoir permeability ≈ 1 mD);

c) ultraheavy oil;

d) shale oil — synthetic oil, obtained during the technological processing of kerogen based combustible oil shale [5, p. 5].

Complex geological, production and infrastructure conditions of their bedding require methods, which are different from those applied during conventional hydrocarbon resources development, processing and transportation. Also, the production is characterized by a sharp decline in well

productivity. Furthermore, currently the production of shale oil is characterized by low efficiency and high cost of production: from 1 ton of shale, enriched in oil, 1.25 to 0.5 barrels of oil are produced. This considerably exceeds the cost of "common" oil [6]. The marginal cost for shale oil producing companies accounts for 85–90 dollars per barrel [7, p. 147].

The US Geological Survey estimates oil reserves from low permeability rocks in Western Siberia at 80–140 billion barrels and technically produced at 67 billion barrels. [8] Russia may become an active producer of shale oil only in future, but the methods of geological exploration and possible hydrocarbons production technology from shale deposits should be developed already today.

This leads to a significant rise of the final product cost, which in its turn stipulates the adoption of legislative stimulus measures of financial and tax nature, taking into account "the economic effect in the long term" and the increase of capitalization to implement the investment program [9, p. 110; 10, p. 38].

Russian Legislation distinguishes the following categories of hard-to-recover reserves subjected to Mineral Extraction Tax (Art. 342 of the Russian Federation Tax Code)[4]:

— subsoil areas located within the boundaries of the Republic of Sakha (Yakutia), Irkutsk Region, Krasnoyarsk Territory, Nenets Autonomous Region, Yamal peninsula in Yamalo-Nenets Autonomous Region;

— subsoil areas located 65° north from northern latitude of Yamalo-Nenets Autonomous Region (Art. 342 of the Russian Federation Tax Code);

— oil deposits north of the Arctic Circle within the boundaries of inland sea waters and territorial sea on the continental shelf of the Russian Federation (Art. 342 of the Russian Federation Tax Code);

— oil deposits in the subsoil areas within the Azov Sea, Caspian Sea, Black Sea and the Sea of Okhotsk;

— oil deposits of Bazhenov, Abalak, Khadum, Domanikovskoy and Tyumen Formations;

— oil reservoirs with the permeability of < 2 мD[5];

— reservoirs with oil viscosity of > 200 mPas (Art. 342 of the Russian Federation Tax Code, Federal Law № 151 from July 27, 2006), > 10 000 mPas;

— new marine deposits (P. 2 Art. 338 of the Russian Federation Tax Code).

Currently, from 28.9 billion tons of recoverable reserves of ABC1 + C2 categories, 65 % (18.7 billion tons) falls on hard-to-recover reserves. Total initial resources are estimated at:

a) Bazhenov Formation of Western Siberia — 330 million tonnes;

b) Domanik deposits of Timan-Pechora and Volga-Ural provinces — 300 million tons.

Besides, the prospects of the production from unconventional hydrocarbon sources are associated with the Lower Silurian deposits of the Kaliningrad region, where the initial total gas resources are estimated by experts at 530 billion m^3, as well as with low-permeability carbonate Vendian — Cambrian reservoirs of Talakanskoe, Verkhnechonskoe and Danilovskoe fields in Eastern Siberia.

"In the production of shale hydrocarbons, Russia is lagging behind, with only 35 wells (700 thousand tons of shale oil was produced from these wells in the last year) against 113 thousand US wells (first place for the extraction of shale hydrocarbons, 40 % from the world production)" [11, p. 24].

The potential of the Tomsk region in the development of Bazhenov and Tyumen Formations, as well as Low Jurassic deposits is high (Table 4).

The presented data shows that 313.3 million tons of oil from the Bazhenov Formation, 927.5 million tons from the Tyumen Formation and not less than 50 % from 1150 million tons of Lower Jurassic could get under the preferential taxation considering the Mineral Extraction Tax in the Tomsk region.

According to Art. 342.2 of the Russian Federation Tax Code, the coefficient K_d characterizing the degree of complexity of the oil production and used for calculating the amount of Mineral Extraction Tax is assumed to be equal to:

0 — during the production of oil from definite hydrocarbon deposits referred to the Bazhenov, Abalak, Khadum and Domanik productive deposits before the expiration of 180 tax periods;

0,8 — during the production of oil from definite hydrocarbon deposits referred to the Tyumen Formation productive deposits before the expiration of 180 tax periods;

[4] Russian Federation Tax Code. Available at the legal reference system "ConsultantPlus".

[5] Resolution of the Russian Federation from 3rd May 2012 № 700-r // Information-juridical portal. Retrieved friom: http://www.garant.ru/products/ipo/prime/doc/70071082/ (date of access: January 22, 2015).

Table 4

Geological reserves and resources of Tomsk region, mln *t*

Formation	Cumulative production	Reserves A + B + C1	Reserves C2	Reserves C3	D1 + D2	Initial reserves and resources
Total	309.3	1438.1	662.9	1554.1	2978.9	6943.4
Conventional formations	309.0	1337.2	555.7	1282.2	1068.5	4552.6
Unconventional formations	0.3	100.9	107.2	271.9	1910.4	2390.8
Bazhenov Formation	0	0.3	0.3	0	312.7	313.3
Tyumen Formation	0.2	50.6	16.3	199.1	661.3	927.5
Low Jurassic	0.1	50.0	90.7	72.8	936.4	1150.0

Table 5

Oil production in Tomsk region, mln *t*

Formation	Cumulative production	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total	309.3	15.4	11.1	9.9	10.0	10.1	10.1	10.5	11.5	11.7	11.3
Conventional formations	309.0	5.4	1.4	9.88	0.0	0.08	0.08	0.47	1.4	1.6	1.2
Unconventional formations	0.3	0.001	—	0.015	0.004	0.023	0.022	0.025	0.072	0.095	0.095

0,2 and 0,4 during the production of oil from definite hydrocarbon deposits in low permeability rocks and net oil pay zone not more than 10 m and more than 10 respectfully before the expiration of 120 tax periods.

Another, apart from the tax period, limit to apply the incentives is the degree of deposits depletion (1 %) from January 1 of the year when the index was achieved.

Positive influence of these incentives introduced on September 1, 2013 is obvious from the dynamic of oil production from unconventional deposits (Table 5).

However, the tax holiday respectfully to the deposits, referred to the Bazhenov, Abalak, Khadum and Domanik productive deposits ($K_d = 0$) were canceled from January 1, 2015. This from our viewpoint, reflects the inconsistency of the Russian Federation Government's actions in the oil sector, which influence particularly the production companies' activity during the strategic programs development and, above all, the development and implementation of innovative solutions, which are necessary for the development of hard-to-recover reserves.

The tax incentive policy, held in the 80s of the last century, particularly in the form of tax credits, contributed to the accomplishing of the "shale revolution" by the USA and its long-term intentions to become a significant player in a global market [12, p. 12; 13, p. 8–9]. Mainly small and medium-sized oil and gas companies benefited from tax preferences, since big businesses were not interested in these incentives as they are having large conventional hydrocarbon deposits in the disposal.

Four among ten companies in the Tomsk region are involved in the production of hard-to-recover oil. At the same time, the prospects of production are significant (Table 6). According to the experts, from the given category of reserves according to the minimum requirements of technological documents, the production should amount to about 1.5 million tons per day, which is 2.5 % from the total reserves. The leader in the introduction of technological methods to develop the Bazhenov Formation is OOO "Imperial Energy". The Snezhnoe field was the site for testing of new methods. Another site for the production of hard-to-recover reserves is Archinskoe deposit in the Tomsk region, developed by OAO "Gazpromneft-Vostok".

Drawing the conclusions.

1. The tax burden of small Tomsk region production companies remains high, as the incentives are granted in respect of oil produced from unconventional deposits, the volumes of which are very small (Table 5). Also, *Kz* coefficient characterizing the reserves value of a particular area is practically inapplicable in calculating the tax on extraction of mineral resources respectfully of oil, as the sites

Table 6

Mineral resource base of Tomsk region in unconventional resources of oil production

Oil production companies having unconventional resources (Bazhenov Formation, Middle Jurassic rock complex)	Number of deposits of Bazhenov Formation and Middle Jurassic rock complex	Number of deposits of Bazhenov Formation and Middle Jurassic rock complex put into oil production	Reserves of category C1+C2 Bazhenov Formation and Middle Jurassic rock complex, thousand tons	Oil production from Bazhenov Formation and Middle Jurassic rock complex (2012), thousand tons
OAO "Rosneft"	2	—	6299	—
OAO "Tomskneft" VNK	10	4	5633	35
ZAO "Tomskaya neft"	2	—	510	—
OOO "Imperial Energy"	1	—	6560	—
OAO "Aliyansneftegaz"	3	3	20604	33
OOO "Matyushkinskaya vertical"	1	1	1143	2
OOO "Terra"	1	—	318	—
OOO "Archinskoe"	5	2	11668	25
OOO "Gazpromneft—Vostok"	4	—	2087	—
OOO "Zhiant"	1	—	2594	—
Total	32	10	60495	95

have been already in operation for a long period and the conditions of *Kz* coefficient application do not correspond the requirement:

a) the amount of the initial recoverable reserves — 5 million tons is defined as the amount of recoverable reserves of categories A, B, C1 and C2, as of January 1st of the year preceding the tax period, and cumulative production since the beginning of the development of a particular oilfield in accordance with the data of the State balance of mineral reserves, approved in the year preceding the year of the tax period[6];

b) the degree of a particular reservoir depletion must be less than or equal to 0.05;

c) license validity period on production work realization, which should be issued from January 1, 2012.

However, it should not be denied that the introduction of the preferences allowed creating more favorable conditions for small fields development which are unprofitable[7]. Another factor that increases the tax burden is changing of the Mineral Extraction Tax rates introduced in the formula for calculating the tax on mineral resources extraction: in 2015 — 530 RUB per 1 ton of produced and processed oil (demineralized, dehydrated and stabilized), in 2016 — 559 RUB. These changes are to some extent a mitigation of the tax burden as in 2014, another rates were planned (2015 — 766 RUB, in 2016 — 857 RUB, in 2017 — 919 RUB).

Thus, the tax legislation does not provide significant differentiation considering the production and geological conditions for companies, which differ in the extent of their activity. However, this does not say about the effectiveness and fairness of the current taxation system for the production companies[8] [14, p.137; 15].

2. Organizational and production characteristics of Tomsk region's small production companies do not allow quick growing of the profit:

[6] Russian Federation Tax Code. Available at the legal reference system "ConsultantPlus".

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[8] Yest li budushcheye u sektora rossiyskikh nezavisimykh neftyanykh kompaniy? Energy center of Moscow school of management SKOLKOVO. February 2014 [Has the sector of the Russian independent oil companies a future? Power center of Moscow School of Management Skolkovo. February, 2014]. AssoNeft. Retrieved from: http://www.assoneft.ru/activities/developments/459/ (date of access: January 22, 2015).

a) conditions of oil supply to the refinery plants, which belong to large vertically integrated oil companies, are specified by the owners of the plant and this fact could significantly increase the expenses of the production companies;

b) large oil production companies limit the access to the pipelines and market;

c) large companies have lower unit costs for the production of one ton of oil;

limited access to financial and investment resources of the banking sector and the stock market, which results in the reduction of the level of capital expenditures.

Thus, there is a need to elaborate the additional measures to stimulate small production companies' activity in the development of unconventional hydrocarbon resources. This issue is also relevant for other production companies, developing shale hydrocarbons deposits in other regions of Russia.

Conclusion

An additional stimulus to foster the development of unconventional reserves in the Tomsk region is the public-private partnership mechanism, where the state, science, engineering and production companies may become the participants. Development of hard-to-recover reserves leads to a multiplier effect in related industries, such as oil service, IT-technologies, production of oil and gas equipment and others. In this case, the state should realize coordination, control and stimulation functions. This will ensure an effective operation of all the participants and create a single information space for high-tech industry development, namely the production of hard-to-recover reserves.

Besides, the mechanism of public-private partnership allows formation of test sites in the existing fields for:

— exploration and development of hard-to-recover oil reserves, choosing and testing of new technologies for unconventional reserves development and the subsequent reproduction and use on the territory of the Russian Federation, as well as the establishment of effective formation intensification technology;

— application of new scientific methods of research, systematization of existing knowledge on unconventional reserves, creating a conceptual geological model, studying the mechanisms of generation and migration of hydrocarbons, determination and localization of prospective areas, assessment of the unconventional reserves resource potential in current assets and in the unallocated subsoil fund;

— attracting the best pros to meet the challenges of scientific and industrial nature, the development of competencies in the field of exploration and production of unconventional resources, establishment and support of innovation centers, research institutions, industry and higher education institutions.

It is also necessary to introduce preferential coefficient in the tax legislation applied for the calculation of Mineral Extraction Tax for small production companies (producing less than 200 tons of oil per year) for the period of five years: 1st year — 0.5; 2nd year — 0.4; 3rd year — 0.3; 4th year — 0.5; 5th year — 0.1.

In the author's opinion, this mechanism will significantly reduce the tax burden for small oil-producing companies and positively influence on the exploration works, the growth of capital investment and hydrocarbons production. Deficiency of tax revenues in the budget system will be compensated by income tax.

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